

Beginning on the 24th snow fell in the interior of the southwestern districts. The snowfall was unusually heavy in northern New Mexico, southeastern Colorado, Indian Territory, and portions of western Texas. At Amarillo, in the Texas panhandle, a total fall of 20 inches was reported. The snowstorm was followed by a cold wave of two days duration in the Southwest, with a minimum temperature of 10° at Amarillo.

The heavy rains that attended the passage of this storm caused rapid rises in the rivers of the Southern States and the Ohio Valley, in anticipation of which general flood warnings had been issued.

BOSTON FORECAST DISTRICT.

Heavy thunderstorms, a cold wave, a thaw, a heavy snowstorm, and gales of hurricane force occurred during the month. The most severe storm of the month was that of the 16-17th, when from 15 to 20 inches of snow fell over the district and gales of great force prevailed along the coast. Owing to the excellent work of the Weather Bureau, little if any damage resulted to shipping. The Bureau was highly commended by the press for giving timely warnings of the storm, thereby saving life and property.—*J. W. Smith, Forecast Official.*

NEW ORLEANS FORECAST DISTRICT.

Storms occurred along the Gulf coast on the 11th, 16th, and 26th, for which timely warnings were issued. At 1 p. m. on the 15th, when the barometer was falling over southeast Texas, Louisiana, and western Mississippi, cold-wave warnings were ordered for Arkansas, northern Louisiana, and southern Texas. The cold-wave warnings were extended to southern Louisiana at night. Reports at 8 a. m. of the 16th showed freezing temperature to the Texas coast and indicated the severest weather of the winter so far, and warnings were sent out that the temperature would fall to 20° in the sugar region and to 24° to 26° along the Gulf coast. On Wednesday morning the temperature was about 24° to 26° along the Gulf coast and 20° in the sugar region. Seed cane and other products were protected generally.—*I. M. Cline, Forecast Official.*

CHICAGO FORECAST DISTRICT.

The cold wave of most importance during the month developed over the British Northwest on the 12th. However, it remained over the Northwestern States without decided movement until the 15th. During the 15th and 16th it extended over the eastern and southern portions of the district. The movement of this cold wave was so tardy and irregular, causing gradually falling temperatures at many points, that warnings were issued only in the eastern and northwestern portions of the district, in advance of a moderate cold wave which was approaching from the Northwest. Three severe storms crossed the district during the month, which were attended by high winds and heavy snow north of their tracks. The first appeared in the Southwest at the beginning of the month; it moved eastward and northeastward toward the Lake region, accompanied by heavy rain, snow, and sleet, reaching the latter section on the 3d and 4th. The second storm was first noticed February 5 on the southern California coast. It followed nearly the track of its predecessor and crossed the southern Lake region on the 7th and 8th. The third also moved from the Southwest. It first crossed eastward to the lower Mississippi Valley, reached the Lake region February 14 and 15, and was followed by a cold wave. Warnings were issued to all railroads and transportation companies in advance of these heavy snowstorms, and, although traffic was maintained only with great difficulty, the advance warnings pre-

pared the various interests for the emergency, and rendered them valuable assistance.

Warnings were issued during the month from time to time to all open ports on Lake Michigan in advance of approaching storms. Vessel interests were especially advised of the dangerous storms of the 3d-4th, 7-8th, 14-15th, and 28th. These four storms were exceptionally severe, but no casualties of any kind were reported.—*H. J. Cor, Professor.*

DENVER FORECAST DISTRICT.

As a result of southwestern storms unusually cold weather was a feature throughout the district, especially in the northern part. In Colorado the month was not only the coldest February but also the coldest month in fifteen years. In anticipation of the development of a disturbance in the middle Plateau region, snow and decidedly lower temperatures were forecast on the morning of the 11th for the northern half of the district, and warnings of a cold wave were issued for Wyoming. The snowfall in northern Utah was very heavy. On the following morning warnings of the approach of severe cold weather were sent to southern Utah and western Colorado. Hemmed in by the Continental Divide and the additional barrier of a high area, reenforced from time to time, on the eastern slope, the low area remained practically stationary in northern Arizona until the afternoon of the 15th, a distribution of pressure that gave uninterrupted and abnormally cold weather in Utah, Wyoming, and Colorado until early in the morning of the 16th, when a depression began to develop in southeastern Wyoming. This low was attended by high winds in Wyoming and northeastern Colorado, uncovering the grass for range stock, and at the same time drifting the unpacked snow into railroad cuts. On many lines it was several days before it was possible to resume traffic. The fair and comparatively fine weather of the succeeding week was exceedingly fortunate for range stock which had been suffering severely from the cold and lack of feed, but where it was possible to heed the warnings by gathering and feeding no losses were incurred. Snow in southeastern Colorado and New Mexico was forecast for several days beginning with the 23d. The snow fall was unusually heavy in northern New Mexico and throughout southeastern Colorado.—*F. H. Brandenburg, Forecast Official.*

SAN FRANCISCO FORECAST DISTRICT.

The month was an unusually quiet one, as February is generally a stormy month on this coast. Generous rains prevailed at the beginning of the month over the southern and central portions of the State, with heavy snow in the mountains. Heavy frosts in southern California on February 3 were accurately forecast. Southeast storm warnings from San Francisco on February 3 were verified. Generous rains prevailed on February 4 in southern California and frost warnings were again verified. Southeast storm warnings were displayed along the coast on February 7 and were verified north of Point Conception. At Point Reyes the wind reached a velocity of 74 miles per hour from the southeast. Beginning about February 10 a succession of high areas prevailed over northern California and northern Nevada. A depression of moderate depth remained over Arizona and the valley of the Colorado for several days. Killing frosts occurred generally north of the Tehachapi on February 14, 15, 16, and 17 and temperatures below freezing were reported at many points in the citrus fruit belt of southern California. Ample warning of these frosts was given to the orange growers and extensive smudging was pursued. During the last decade of the month the weather was fair and pleasant with the exception of the 22d, when a small

disturbance prevailed off the coast of northern California.—*A. G. McAdie, Professor.*

PORTLAND, OREG., FORECAST DISTRICT.

During the first decade of the month two severe storms passed over the district, for which timely warnings were issued. The unusually high wind velocities of 72 miles southwest at Tatoosh Island, and 80 miles south at North Head occurred during the night of the 8th. Just at the close of this stormy period the German bark *Alsternirie* stranded at the mouth of the Columbia River while attempting to sail across the bar without a pilot. No lives were lost and the ship was afterwards floated and safely dry docked. From the 11th until the close of the month fair weather generally prevailed in consequence of disturbances appearing too far south to cause rain in the North Pacific States. Incoming vessels reported few storms east of the one hundred and eightieth meridian along the northern track of steamers plying between Asiatic and north Pacific ports.—*E. A. Beals, Forecast Official.*

AREAS OF HIGH AND LOW PRESSURE.

Movements of centers of areas of high and low pressure.

Number.	First observed.			Last observed.			Path.		Average velocity.	
	Date.	Lat. N.	Long. W.	Date.	Lat. N.	Long. W.	Length.	Duration.	Daily.	Hourly.
High areas.										
I.....	1, a. m.	53	108	7, a. m.	32	65	Miles. 3,175	Days. 6.0	Miles. 529	Miles. 22.0
II.....	4, a. m.	45	123	8, a. m.	47	65	2,825	4.0	706	29.4
III.....	6, p. m.	39	120	10, a. m.	37	76	2,950	3.5	843	35.1
IV.....	12, p. m.	54	114	16, p. m.	47	101	725	4.0	181	7.5
V.....	14, a. m.	47	123	18, a. m.	30	82	2,900	4.0	725	30.2
VI.....	17, a. m.	53	105	20, a. m.	32	65	2,800	3.0	933	38.9
VII.....	19, p. m.	44	116	23, p. m.	32	65	3,100	4.0	775	32.3
VIII.....	22, a. m.	54	114	25, p. m.	40	75	2,250	3.5	643	26.8
Sums.....							20,725	32.0	5,335	222.2
Mean of 8 paths.....							2,591		667	27.8
Mean of 32.0 days.....									648	27.0
Low areas.										
I.....	1 a. m.	39	120	5, p. m.	46	60	3,600	4.5	800	33.3
II.....	4, a. m.	34	118	9, p. m.	46	60	3,925	5.5	714	29.8
III.....	7, a. m.	48	123	12, p. m.	46	60	3,300	5.5	600	25.0
IV.....	8, p. m.	35	112	17, p. m.	46	60	3,450	4.0	862	35.9
V.....	14, p. m.	35	112	22, p. m.	46	60	2,350	3.0	793	32.6
VI.....	19, a. m.	54	114	28, p. m.	48	68	2,625	3.5	750	31.2
	25, a. m.	32	106				2,925	3.5	836	34.8
Sums.....							22,175	29.5	5,345	222.6
Mean of 7 paths.....							3,168		764	31.8
Mean of 29.5 days.....									752	31.3

For graphic presentation of the movements of these highs and lows see Charts I and II.—*Geo. E. Hunt, Chief Clerk, Forecast Division.*

RIVERS AND FLOODS.

At the end of February there was considerably more ice in the rivers of the northern districts than at the corresponding date of 1902, although the upper Mississippi was not frozen so far to the southward. The increase varied from 1 to 7 inches in the upper Mississippi and from 4 to 10 inches in the Missouri. The actual thickness in inches at a few selected stations was as follows: Moorhead, Minn., 38; Bismarck, N. Dak., 33; Sioux City, Iowa, 24.5; Omaha, Nebr., 14.5; St. Paul, Minn., 24, and Davenport, Iowa, 14.5.

The river stages of the lower Missouri and upper Mississippi did not differ materially from those of the preceding month.

Over the Ohio Valley, the Gulf and Atlantic States, however, the precipitation was frequent and heavy, ranging from 2 to 10

inches above the normal amount without any unusually low temperatures. As a consequence, all the rivers of those districts rose to flood stages. The Mississippi below the mouth of the Ohio had passed the danger line at all points and was still rising steadily at the end of the month. Reports of these floods are given below, except those of the lower Ohio, lower Mississippi, and the Tennessee, which will be published later.

PITTSBURG DISTRICT.

By Mr. Frank Ridgway, Official in Charge of the United States Weather Bureau office, Pittsburg, Pa.

The conditions prevailing on the morning of the 3d throughout all sections southwest of Pittsburg indicated rising temperatures, heavy rains accompanied by thawing, and general thawing conditions over the Allegheny and Monongahela valleys, and, as a consequence, high water. As all of the ice had passed out of the Allegheny and Monongahela rivers and their tributaries during the last week of January, a rise at this time could be caused only by the melting of what snow remained in the mountains and by heavy rains. On the 3d the rivers had begun to show the effect of the melting and during that night they were steadily rising. In addition to this, heavy rains were falling, due to the storm development in the southwest. At 8 a. m. of the 4th the rivers showed a rise at Pittsburg of about 4 feet, and reports indicated that all of the tributaries were rising steadily and that heavy rains were falling as anticipated. The upper river stations were immediately called upon for special hourly observations, and these showed an average rise of 0.2 to 0.5 foot an hour in all of the streams. At noon preliminary advices were sent out in all directions through special editions of the newspapers and by means of the telephone that all interests affected by high water should keep in touch with the Weather Bureau office night and day.

At 4 p. m. I informed the police departments of Pittsburg and Allegheny that all interests in the lower districts of their respective cities should be notified to make preparations for a stage of 23 feet by Thursday morning, February 5, and that all property affected by a stage of 25 feet should be moved at once. This information was also given to the press, which promptly published the same. The rivers rose slowly and steadily all that day and throughout the night. The danger line of 22 feet was passed at 3 a. m. of the 5th, and the maximum stage of 24 feet was attained at 9 a. m. of that day, making a total rise of about 7 feet in eighteen hours.

Mr. Ridgway also made the following report on the moderate flood of the 16th, when a 22-foot stage was reached at Pittsburg:

On the morning of the 16th the reports from the Monongahela and Kiskiminitas rivers and tributaries showed that heavy rains had fallen and that the rivers were rising rapidly. The stage at Pittsburg was then 12.9 feet, a rise of nearly 3.0 feet during the previous twelve hours. Special hourly reports were at once called for, but before they were received warnings were issued through the departments of police of Pittsburg and Allegheny, through the noon special editions of the press, by telephone, and by telegraph, notifying all concerned to make preparations for a stage of 22.0 feet, or over, at Pittsburg by midnight. Inspection of the special reports from the upper river stations soon disclosed the fact that the maximum would not be over 22.0 feet, as the Kiskiminitas, Monongahela, and tributaries were contributing all the water, the Allegheny River above Freeport doing practically nothing, as the heavy rains had not reached the upper Allegheny and tributaries, and what did fall there was controlled by low temperature. At midnight the stage at Pittsburg was 21.5 feet, a rise of 8.6 feet since 8 a. m., or a total rise of 11.7 feet. The river was then rising about two-tenths of a foot an hour, with all the upper streams about stationary. The maximum stage reached was 21.9 feet at 2 a. m. of the 17th, at which height it remained stationary until 4 a. m., when the water commenced to fall. At 8 a. m. of the 17th it showed a stage of 21.3 feet and was falling at the rate of 0.2 of a foot an hour. No warnings were necessary for points below Pittsburg.

CINCINNATI DISTRICT.

By Mr. S. S. Bassler, Official in Charge of the United States Weather Bureau office, Cincinnati, Ohio.

During the month of February, 1903, there were two overflows of the Ohio River, neither of which, however, quite reached the danger line in the Cincinnati district, except at Point Pleasant, W. Va.

On February 2 there was a decided local rise of 11.3 feet during the twenty-four hours ending at 8 a. m. Heavy rainfall in the immediate region caused a rapid rise in the neighboring streams emptying into the Ohio near this point. Truck gardens were overflowed and much early vegetable stuff destroyed. Traction lines suffered considerably and traffic was delayed. Merchants in the "Bottoms" became anxious about the rising water, and kept in touch with the Weather Bureau office. They